CLAIMS

1. Expanded polystyrene (EPS) solubilization method, characterized in that:

i) the EPS is brought into contact with at least one initial solvent allowing the EPS to be changed from an expanded solid state to that of a gel; and

ii) said gel is brought into contact with at least one complementary solvent, distinct from the initial solvent, allowing the solubilization of said gel in such a way as to obtain a true solution.

2. Method according to claim 1, characterized in that Stages i) and ii) are carried out successively in this order or simultaneously.

3. Method according to claims 1 and 2, characterized in that it does not include the use of a non-fatty lubricant, such as glycerol.

4. Method according to any one of claims 1 to 3, characterized in that the quantity of initial solvent represents between 10 % and 70 %, preferably between 30 % and 70 % of the volume of the true solution obtained, and the quantity of complementary solvent represents between 10 % and 70 %, preferably between 10 % and 50 % of the volume of the true solution obtained.

5. Method according to any one of claims 1 to 4, characterized in that the proportion of complementary solvent represents between 1 % and 30 %, preferably between 15 % and 30 % of the volume of initial solvent.

6. Method according to any one of claims 1 to 5, characterized in that the initial solvent has a solubility parameter greater than 9.5 $(cal/cm^3)^{1/2}$.

7. Method according to any one of claims 1 to 6, characterized in that the initial solvent is chosen from acetone, butyronitrile, isophorone, *n*-butyl lactate, methylisobutylcarbinol, chloroethylene, ethyl-2-hexanol, methylene chloride and cyclohexanone.

8. Method according to any one of claims 1 to 7, characterized in that the initial solvent is acetone.

9. Method according to any one of claims 1 to 8, characterized in that the complementary solvent has a solubility parameter comprised between 8.5 $(cal/cm^3)^{1/2}$ and 9.5 $(cal/cm^3)^{1/2}$, preferably between 8.7 $(cal/cm^3)^{1/2}$ and 9.3 $(cal/cm^3)^{1/2}$.

10. Method according to any one of claims 1 to 9 characterized in that the complementary solvent is chosen from cyclohexamine, ethyl acetate, butyric acid, chloroform, mesityl oxide, methyl ethyl ketone, 1-chlorobutane, amyl acetate, *n*-butyl acetate, methylal, methyl isoamyl ketone, methyl isobutyl ketone, propyl acetate, diethyl ketone, ethylbenzene and xylene.

11. Method according to any one of claims 1 to 10, characterized in that the complementary solvent is ethyl acetate or methyl ethyl ketone (MEK), or a mixture of ethyl acetate and methyl ethyl ketone.

12. Method according to any one of claims 1 to 11, characterized in that the initial solvent is acetone and the complementary solvent is ethyl acetate.

13. Method according to any one of claims 1 to 12, characterized in that the initial solvent is acetone and the complementary solvent is methyl ethyl ketone.

14. Method according to any one of claims 1 to 13, characterized in that said method comprises a preliminary stage in which the EPS is washed with a solution of initial solvent containing water.

15. Method according to any one of claims 1 to 14, characterized in that Stage i) is carried out in the presence of an anhydrous salt allowing the residual water absorbed by the EPS or present at the surface of the EPS to be removed.

16. Method according to claim 15, in which the anhydrous salt is of the calcium sulphate type.

17. Method according to any one of claims 14 to 16, in which the solution of initial solvent for preliminary washing of the EPS is an acetone solution containing from 5 to 40 % water, preferably 10 to 30 %.

18. Composition allowing the solubilization of EPS comprising

- an initial solvent allowing the EPS to be changed from an expanded solid state to a gel;
- and at least one complementary solvent distinct from the initial solvent, allowing the complete solubilization of said gel in such a way as to obtain a true solution.

19. True solution which can be obtained by the method according to any one of claims 1 to 17.

20. True solution according to claim 19, characterized in that it comprises a quantity of EPS per litre of final solution comprised between 0.2 and 0.8 kg, preferably between 0.3 and 0.6 kg.

21. True solution according to one of claims 19 and 20, characterized in that it also comprises at least one additive chosen from:

- a modifier for improving the mechanical properties of the solution;
- a tackifier;
- a cohesion agent, such as alcohol; and
- a load for increasing the volume.

22. True solution according to claim 21, in which the modifier is a plasticizer, such as DOP, in a proportion comprised between 5 % and 20 %, preferably between 10 % and 15 % by volume with respect to the total volume of the solution.

23. True solution according to claim 21, in which the tackifier is rosin, used in a proportion comprised between 10 % and 20 % by volume with respect to the total volume of the solution.

24. Use of a true solution according to any one of claims 15 to 19, as adhesive.

25. Use of a solution according to any one of claims 19 to 23, for the production of particle boards, putty, sealing joints, paint, varnish or strippable protection for windows or resin.

26. Use of a true solution according to any one of claims 19 to 23, for the regeneration or synthesis of a styrene-based polymer or copolymer.